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EXAMINER
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THANGAVELU, KANDASAMY

ART UNIT	PAPER NUMBER
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2123

MAIL DATE	DELIVERY MODE
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01/14/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

09/964,591

Applicant(s)

MATSUDA ET AL.

Examiner

Kandasamy Thangavelu

Art Unit

2123

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 05 October 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-41 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-41 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 September 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

1. This communication is in response to the Applicants' communication mailed on October 10, 2006 and the Appeal Brief mailed on October 5, 2007. Claims 1, 4-5, 7-10, 12-16, 18-21, 24-25, 27-30, 33-34, 36-39 and 41 were amended. Claims 1-41 of the application are pending. This office action is made non-final.

#### ***Prosecution reopened***

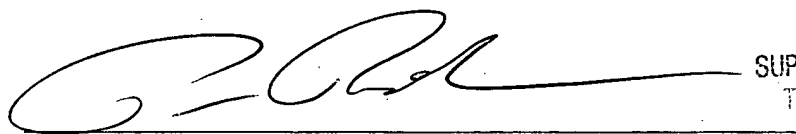
2. In view of the Appeal Brief filed on October 5, 2007, PROSECUTION IS HEREBY REOPENED as set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:



PAUL RODRIGUEZ  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2100

### ***Claim Objections***

3. The following is a quotation of 37 C.F.R § 1.75 (d)(1):

The claim or claims must conform to the invention as set forth in the remainder of the specification and terms and phrases in the claims must find clear support or antecedent basis in the description so that the meaning of the terms in the claims may be ascertainable by reference to the description.

4. Claims 7, 18, 27 and 36 are objected to because of the following informalities:

Claim 7, Lines 3-4, "hardware resource allocated by said resource request in said requesting a resource" appears to be incorrect and it appears that it should be "hardware resource allocated by said resource manager in said allocating a resource".

Claim 18, Lines 3-4, "hardware resource allocated by said resource request in said requesting a resource" appears to be incorrect and it appears that it should be "hardware resource allocated by said resource manager in said allocating a resource".

Claim 27, Lines 3-4, "hardware resource allocated by said resource request in said requesting a resource" appears to be incorrect and it appears that it should be "hardware resource allocated by said resource manager in said allocating a resource".

Claim 36, Lines 3-4, "hardware resource allocated by said resource request in said requesting a resource" appears to be incorrect and it appears that it should be "hardware resource allocated by said resource manager in said allocating a resource".

Appropriate corrections are required.

***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the first paragraph of 35 U.S.C. §112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 1-41 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

6.1 Amended claim 1 states, "requesting a resource in which a thread manager, which controls threads each forming an execution unit of a program, makes a request for information about a hardware resource relating to a hardware resource needed for execution of each of threads ... to a resource manager which manages said information about the hardware resource;

allocating a resource in which said resource manager allocates said information about a hardware resource meeting said request ...; and

... said thread manager and said resource manager executing said requesting, allocating, and controlling repeatedly in cooperation with each other until the execution of said thread reaches completion while dynamically allocating information about a hardware resource relating to necessary hardware resources to the thread ...". There is no support for "a thread manager, which controls threads each forming an execution unit of a program, makes a request for information about a hardware resource"; a resource manager which manages said information about the hardware resource; said resource manager allocates said information about a hardware resource meeting said request; and "dynamically allocating information about a hardware resource" in the specification. **This is new material added in the amendment and not found in the original specification.** The applicants are required to show where in the specification information about a hardware resource is described.

6.2 Amended claim 4 states, "a plurality of resource managers each corresponding to said resource manager are provided in conjunction with the types of said information about hardware resources, and

in said allocating a resource, each of said resource managers allocates said information about a hardware resource...". There is no support for "resource manager are provided in conjunction with the types of said information about hardware resources, and

in said allocating a resource, each of said resource managers allocates said information about a hardware resource" in the specification. This is new material added in the amendment

and not found in the original specification. The applicants are required to show where in the specification information about a hardware resource is described.

6.3 Amended claim 5 states, “a plurality of resource managers each corresponding to said resource manager are provided in conjunction with the types of said information about hardware resources and are hierarchized according to the dependence among said information about hardware resources, and

in said resource allocating, allocation of information about a hardware resource is made in consideration of the dependence between said information about a hardware resource managed by one of said resource managers and said information about a hardware resource managed by the other resource manager ...”. There is no support for “a plurality of resource managers each corresponding to said resource manager are provided in conjunction with the types of said information about hardware resources and are hierarchized according to the dependence among said information about hardware resources, and

in said resource allocating, allocation of information about a hardware resource is made in consideration of the dependence between said information about a hardware resource managed by one of said resource managers and said information about a hardware resource managed by the other resource manager” in the specification. This is new material added in the amendment and not found in the original specification. The applicants are required to show where in the specification information about a hardware resource is described.

6.4 Amended claim 7 states, “said resource manager monitors read/write requests with respect to said information about a hardware resource allocated by said resource request in said requesting a resource to make a decision on a competition state in read/write operation on said information about a hardware resource among a plurality of threads ...”. There is no support for “said resource manager monitors read/write requests with respect to said information about a hardware resource allocated by said resource request in said requesting a resource to make a decision on a competition state in read/write operation on said information about a hardware resource among a plurality of threads” in the specification. This is new material added in the amendment and not found in the original specification. The applicants are required to show where in the specification information about a hardware resource is described.

6.5 Amended claim 8 states, “said resource manager monitors the number of resource requests with respect to said information about a hardware resource to detect a bottleneck ...”. There is no support for “said resource manager monitors the number of resource requests with respect to said information about a hardware resource to detect a bottleneck” in the specification. This is new material added in the amendment and not found in the original specification. The applicants are required to show where in the specification information about a hardware resource is described.

6.6 Amended claim 9 states, “said resource manager monitors the number of resource requests with respect to said information about a hardware resource to detect blocking ...”. There is no support for “said resource manager monitors the number of resource requests with



respect to said information about a hardware resource to detect blocking e” in the specification.

This is new material added in the amendment and not found in the original specification. The applicants are required to show where in the specification information about a hardware resource is described.

6.7 Amended claim 10 states, “said thread has a budget on a time of occupancy of information about a hardware resource relating to a hardware resource...”. There is no support for “said thread has a budget on a time of occupancy of information about a hardware resource relating to a hardware resource...” anywhere in the specification. This is new material added in the amendment and not found in the original specification.

6.8 Amended claim 12 states, “requesting a resource in which a thread manager, ... makes a request for information about a hardware resource ... to a resource manager which manages said information about the hardware resource data;

allocating a resource in which said resource manager allocates said information about a hardware resource ...;

... with said thread manager and said resource manager executing said requesting, allocating, and controlling repeatedly ... while dynamically allocating information about a hardware resource relating to necessary hardware resources ...”. There is no support for “requesting a resource in which a thread manager, ... makes a request for information about a hardware resource ... to a resource manager which manages said information about the hardware resource data;

allocating a resource in which said resource manager allocates said information about a hardware resource ...;

... with said thread manager and said resource manager executing said requesting, allocating, and controlling repeatedly ... while dynamically allocating information about a hardware resource relating to necessary hardware resources ...” anywhere in the specification. This is new material added in the amendment and not found in the original specification. The applicants are required to show where in the specification information about a hardware resource is described.

6.9 Amended claim 13 states, “a resource manager for managing information about a hardware resource relating to a hardware resource ...

resource requesting means for making a request for information about a hardware resource relating to a hardware resource needed ...; and

... resource allocating means for allocating information about a hardware resource relating to a hardware resource meeting the request ...on while dynamically allocating information about a hardware resource relating to necessary hardware resources to the thread”. There is no support for “a resource manager for managing information about a hardware resource relating to a hardware resource ...

resource requesting means for making a request for information about a hardware resource relating to a hardware resource needed ...; and

... resource allocating means for allocating information about a hardware resource relating to a hardware resource meeting the request ...on while dynamically allocating information about a hardware resource relating to necessary hardware resources to the thread”

anywhere in the specification. This is new material added in the amendment and not found in the original specification. The applicants are required to show where in the specification information about a hardware resource is described.

6.10 Amended claim 14 states, “a thread manager for controlling threads each forming an execution unit of said program and as a resource manager for managing information about a hardware resource relating to a hardware resource needed for execution of each of threads, by:

requesting a resource in which said thread manager makes a request for information about a hardware resource ...;

allocating a resource in which said resource manager allocates said information about a hardware resource meeting the request ...; and

... said thread manager and said resource manager executing the requesting, the allocating, and the controlling repeatedly ... while dynamically allocating information about a hardware resource relating to necessary hardware resources”. There is no support for “a thread manager for controlling threads each forming an execution unit of said program and as a resource manager for managing information about a hardware resource relating to a hardware resource needed for execution of each of threads, by:

requesting a resource in which said thread manager makes a request for information about a hardware resource ...;

allocating a resource in which said resource manager allocates said information about a hardware resource meeting the request ...; and

... said thread manager and said resource manager executing the requesting, the allocating, and the controlling repeatedly ... while dynamically allocating information about a hardware resource relating to necessary hardware resources” anywhere in the specification. This is new material added in the amendment and not found in the original specification. The applicants are required to show where in the specification information about a hardware resource is described.

6.11 Amended claim 15 states, “a plurality of resource managers each corresponding to said resource manager are provided in conjunction with the types of information about a hardware resource relating to hardware resources, and

in said resource allocating, each of said resource managers allocates said information about a hardware resource, said resource manager manages”. There is no support for “a plurality of resource managers each corresponding to said resource manager are provided in conjunction with the types of information about a hardware resource relating to hardware resources, and

in said resource allocating, each of said resource managers allocates said information about a hardware resource, said resource manager manages” anywhere in the specification. This is new material added in the amendment and not found in the original specification.

6.12 Amended claim 16 states, “a plurality of resource managers each corresponding to said resource manager are provided in conjunction with the types of information about a hardware resource relating to hardware resources and are hierarchized according to the dependence among said information about a hardware resources, and

in said resource allocating, the information about a hardware resource allocation is made in consideration of the dependence between said information about a hardware resource managed by one of said resource managers and said information about a hardware resource managed by the other resource manager”. There is no support for “a plurality of resource managers each corresponding to said resource manager are provided in conjunction with the types of information about a hardware resource relating to hardware resources and are hierarchized according to the dependence among said information about a hardware resources, and

in said resource allocating, the information about a hardware resource allocation is made in consideration of the dependence between said information about a hardware resource managed by one of said resource managers and said information about a hardware resource managed by the other resource manager” anywhere in the specification. This is new material added in the amendment and not found in the original specification. The applicants are required to show where in the specification information about a hardware resource is described.

6.13 Amended claim 18 states, “said resource manager monitors read/write requests with respect to said information about a hardware resource allocated by said resource request in said requesting a resource to make a decision on a competition state in read/write operation on said information about a hardware resource among a plurality of threads ...”. There is no support for “said resource manager monitors read/write requests with respect to said information about a hardware resource allocated by said resource request in said requesting a resource to make a decision on a competition state in read/write operation on said information about a hardware resource among a plurality of threads” in the specification. This is new material added in the

amendment and not found in the original specification. The applicants are required to show where in the specification information about a hardware resource is described.

6.14 Amended claim 19 states, “said resource manager monitors the number of resource requests with respect to said information about a hardware resource to detect a bottleneck ...”.

There is no support for “said resource manager monitors the number of resource requests with respect to said information about a hardware resource to detect a bottleneck” in the specification.

This is new material added in the amendment and not found in the original specification. The applicants are required to show where in the specification information about a hardware resource is described.

6.15 Amended claim 20 states, “said resource manager monitors the number of resource requests with respect to said information about a hardware resource to detect blocking ...”.

There is no support for “said resource manager monitors the number of resource requests with respect to said information about a hardware resource to detect blocking e” in the specification.

This is new material added in the amendment and not found in the original specification. The applicants are required to show where in the specification information about a hardware resource is described.

6.16 Amended claim 21 states, “said thread has a budget on a time of occupancy of information about a hardware resource relating to a hardware resource...”. There is no support for “said thread has a budget on a time of occupancy of information about a hardware resource

relating to a hardware resource..." anywhere in the specification. This is new material added in the amendment and not found in the original specification.

6.17 Amended claim 24 states, "a plurality of resource managers each corresponding to said resource manager are provided in conjunction with the types of information about a hardware resource relating to hardware resources, and

in said resource allocating, each of said resource managers allocates said information about a hardware resource, said resource manager manages". There is no support for "a plurality of resource managers each corresponding to said resource manager are provided in conjunction with the types of information about a hardware resource relating to hardware resources, and

in said resource allocating, each of said resource managers allocates said information about a hardware resource, said resource manager manages" anywhere in the specification. This is new material added in the amendment and not found in the original specification.

46.18 Amended claim 25 states, "a plurality of resource managers each corresponding to said resource manager are provided in conjunction with the types of information about a hardware resource relating to hardware resources and are hierarchized according to the dependence among said information about a hardware resources, and

in said resource allocating, the information about a hardware resource allocation is made in consideration of the dependence between said information about a hardware resource managed by one of said resource managers and said information about a hardware resource managed by the other resource manager". There is no support for "a plurality of resource managers each

corresponding to said resource manager are provided in conjunction with the types of information about a hardware resource relating to hardware resources and are hierarchized according to the dependence among said information about a hardware resource, and

in said resource allocating, the information about a hardware resource allocation is made in consideration of the dependence between said information about a hardware resource managed by one of said resource managers and said information about a hardware resource managed by the other resource manager” anywhere in the specification. This is new material added in the amendment and not found in the original specification. The applicants are required to show where in the specification information about a hardware resource is described.

6.19 Amended claim 27 states, “said resource manager monitors read/write requests with respect to said information about a hardware resource allocated by said resource request in said requesting a resource to make a decision on a competition state in read/write operation on said information about a hardware resource among a plurality of threads ...”. There is no support for “said resource manager monitors read/write requests with respect to said information about a hardware resource allocated by said resource request in said requesting a resource to make a decision on a competition state in read/write operation on said information about a hardware resource among a plurality of threads” in the specification. This is new material added in the amendment and not found in the original specification. The applicants are required to show where in the specification information about a hardware resource is described.



6.20 Amended claim 28 states, “said resource manager monitors the number of resource requests with respect to said information about a hardware resource to detect a bottleneck ...”.

There is no support for “said resource manager monitors the number of resource requests with respect to said information about a hardware resource to detect a bottleneck” in the specification.

This is new material added in the amendment and not found in the original specification. The applicants are required to show where in the specification information about a hardware resource is described.

6.21 Amended claim 29 states, “said resource manager monitors the number of resource requests with respect to said information about a hardware resource to detect blocking ...”.

There is no support for “said resource manager monitors the number of resource requests with respect to said information about a hardware resource to detect blocking e” in the specification.

This is new material added in the amendment and not found in the original specification. The applicants are required to show where in the specification information about a hardware resource is described.

6.22 Amended claim 30 states, “said thread has a budget on a time of occupancy of information about a hardware resource relating to a hardware resource...”. There is no support for “said thread has a budget on a time of occupancy of information about a hardware resource relating to a hardware resource...” anywhere in the specification. This is new material added in the amendment and not found in the original specification.

6.23 Amended claim 33 states, “a plurality of resource managers each corresponding to said resource manager are provided in conjunction with the types of information about a hardware resource relating to hardware resources, and

in said resource allocating, each of said resource managers allocates said information about a hardware resource, said resource manager manages”. There is no support for “a plurality of resource managers each corresponding to said resource manager are provided in conjunction with the types of information about a hardware resource relating to hardware resources, and

in said resource allocating, each of said resource managers allocates said information about a hardware resource, said resource manager manages” anywhere in the specification. This is new material added in the amendment and not found in the original specification.

6.24 Amended claim 34 states, “a plurality of resource managers each corresponding to said resource manager are provided in conjunction with the types of information about a hardware resource relating to hardware resources and are hierarchized according to the dependence among said information about a hardware resources, and

in said resource allocating, the information about a hardware resource allocation is made in consideration of the dependence between said information about a hardware resource managed by one of said resource managers and said information about a hardware resource managed by the other resource manager”. There is no support for “a plurality of resource managers each corresponding to said resource manager are provided in conjunction with the types of information about a hardware resource relating to hardware resources and are hierarchized according to the dependence among said information about a hardware resources, and

in said resource allocating, the information about a hardware resource allocation is made in consideration of the dependence between said information about a hardware resource managed by one of said resource managers and said information about a hardware resource managed by the other resource manager” anywhere in the specification. This is new material added in the amendment and not found in the original specification. The applicants are required to show where in the specification information about a hardware resource is described.

6.25 Amended claim 36 states, “said resource manager monitors read/write requests with respect to said information about a hardware resource allocated by said resource request in said requesting a resource to make a decision on a competition state in read/write operation on said information about a hardware resource among a plurality of threads ...”. There is no support for “said resource manager monitors read/write requests with respect to said information about a hardware resource allocated by said resource request in said requesting a resource to make a decision on a competition state in read/write operation on said information about a hardware resource among a plurality of threads” in the specification. This is new material added in the amendment and not found in the original specification. The applicants are required to show where in the specification information about a hardware resource is described.

6.26 Amended claim 37 states, “said resource manager monitors the number of resource requests with respect to said information about a hardware resource to detect a bottleneck ...”. There is no support for “said resource manager monitors the number of resource requests with respect to said information about a hardware resource to detect a bottleneck” in the specification.

This is new material added in the amendment and not found in the original specification. The applicants are required to show where in the specification information about a hardware resource is described.

6.27 Amended claim 38 states, “said resource manager monitors the number of resource requests with respect to said information about a hardware resource to detect blocking ...”.

There is no support for “said resource manager monitors the number of resource requests with respect to said information about a hardware resource to detect blocking e” in the specification.

This is new material added in the amendment and not found in the original specification. The applicants are required to show where in the specification information about a hardware resource is described.

6.28 Amended claim 39 states, “said thread has a budget on a time of occupancy of information about a hardware resource relating to a hardware resource...”. There is no support for “said thread has a budget on a time of occupancy of information about a hardware resource relating to a hardware resource...” anywhere in the specification. This is new material added in the amendment and not found in the original specification.

6.29 Amended claim 41 states, “requesting a resource in which a thread manager, ... makes a request for information about a hardware resource ... to a resource manager which manages said information about the hardware resource;

allocating a resource in which said resource manager allocates said information about a hardware resource ...;

... with said thread manager and said resource manager executing said requesting, allocating, and controlling repeatedly ... while dynamically allocating information about a hardware resource relating to necessary hardware resources ...”. There is no support for “requesting a resource in which a thread manager, ... makes a request for information about a hardware resource ... to a resource manager which manages said information about the hardware resource data;

allocating a resource in which said resource manager allocates said information about a hardware resource ...;

... with said thread manager and said resource manager executing said requesting, allocating, and controlling repeatedly ... while dynamically allocating information about a hardware resource relating to necessary hardware resources ...” anywhere in the specification. This is new material added in the amendment and not found in the original specification. The applicants are required to show where in the specification information about a hardware resource is described.

6.30 Claims rejected but not specifically addressed are rejected based on their dependency on rejected claims.

### ***Claim Interpretations***

7. The specification, Page 7, Line 17 to Page 8, Line 7 state, “1) a resource requesting step in which a thread manager, which controls threads each forming an execution unit of a program, makes a request for hardware resource needed for execution of each of threads representative of a function required until the operation of the logical unit reaches completion according to a design specification of a logical unit, to a resource manager which manages the hardware resource,

2) a resource allocating step in which said resource manager allocates the hardware resource meeting the request to the thread in accordance with a rule prescribed in advance, and

3) a resource control step in which the thread manager controls an execution state of the thread in accordance with a result of the allocation made by the resource manager,

with the thread manager and the resource manager executing the aforesaid steps 1) to 3) repeatedly in cooperation with each other until the execution of the thread reaches completion for simulating the operation of the logical unit to be conducted up to the completion”.

Specification, Page 10, Lines 22-24 state, “the resource manager dynamically allocates a needed hardware resource whenever the thread is executed”.

Therefore, the Examiner has interpreted all references to “information about hardware resource” as “hardware resource”. These interpretations are used in the following art rejections.

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. Claims 1-7, 10-18, 21-27, 30-36 and 39-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Emer et al.** (U.S. Patent 6,493,741) in view of **Stamm et al.** (U.S. Patent 6,711,616).

10.1 **Emer et al.** teaches method and apparatus to quiesce a portion of a simultaneous multi-threaded central processing unit. Specifically as per claim 1, **Emer et al.** teaches a method of simulating an operation of a logical unit (CL2, L16-21; CL5, L22-25); comprising:

a thread manager, which controls threads each forming an execution unit of a program, for execution of each of threads representative of a series of functions required until the

operation of the logical unit reaches completion according to a design specification of the logical unit (Fig. 2; Fig. 3, Item 305; CL1, L7-21; Fig. 1(c); CL1, L66 to CL2, L3; CL2, L16-21);

requesting a resource in which a thread manager makes a request for information about a hardware resource relating to a hardware resource needed for execution of each of threads, to a resource manager which manages the information about the hardware resource (CL2, L3-6);

allocating a resource in which the resource manager allocates the information about a hardware resource meeting the request to the thread (CL2, L3-6);

controlling a thread in which the thread manager controls an execution state of the thread in accordance with a result of the allocation made by the resource manager (CL1, L10-21; Fig. 1 (c); CL1, L66 to CL2, L6); and

dynamically allocating information about a hardware resource relating to necessary hardware resources to the thread by the resource manager every time the generated thread is executed (CL2, L3-6).

**Emer et al.** does not expressly teach allocating a resource in which the resource manager allocates the information about a hardware resource meeting the request to the thread in accordance with a rule prescribed in advance. **Stamm et al.** teaches allocating a resource in which the resource manager allocates the information about a hardware resource meeting the request to the thread in accordance with a rule prescribed in advance (CL1, L23-25 and 28-30; CL1, L51-62; Abstract, L8-11; CL4, L11-16; CL4, L36-38; CL6, L1-5). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Emer et al.** with the method of **Stamm et al.** that included allocating a resource in



which the resource manager allocates the information about a hardware resource meeting the request to the thread in accordance with a rule prescribed in advance because that would allow selecting a thread for execution by the processor as a function of resource requirements of the thread and the available resource characteristics of the processor (Abstract, L8-11); such that the resource requirements of the thread most closely matched the available resources of the processor (CL4, L11-15); and defining a hierarchy of threads to be executed, defining an allocation of resources among the threads and selecting the threads based on the criteria previously described (CL6, L1-5).

**Emer et al.** teaches the thread manager and the resource manager executing the requesting, allocating, and controlling in cooperation with each other until the execution of the thread reaches completion simulating the operation of the logical unit to be conducted up to the completion (CL1, L10-21; Fig. 1 (c); CL1, L66 to CL2, L6). **Emer et al.** does not expressly teach the thread manager and the resource manager executing the requesting, allocating, and controlling repeatedly in cooperation with each other until the execution of the thread reaches completion simulating the operation of the logical unit to be conducted up to the completion. **Stamm et al.** teaches the thread manager and the resource manager executing the requesting, allocating, and controlling repeatedly in cooperation with each other until the execution of the thread reaches completion simulating the operation of the logical unit to be conducted up to the completion (Abstract; Fig. 3; Fig. 4).

Per claim 2: **Emer et al.** does not expressly teach that the series of functions are represented in a plurality of sequential threads. **Stamm et al.** teaches that the series of functions are represented in a plurality of sequential threads (CL2, L39-48).

Per claim 3: **Emer et al.** teaches that the series of functions are represented in a plurality of concurrently executed threads (CL1, L10-12). **Emer et al.** does not expressly teach that the series of functions are represented in a plurality of sequential threads. **Stamm et al.** teaches that the series of functions are represented in a plurality of sequential executed threads (CL2, L39-48).

Per claim 4: **Emer et al.** does not expressly teach that a plurality of resource managers each corresponding to the resource manager are provided in conjunction with the types of the information about hardware resources, and in the allocating a resource, each of the resource managers allocates the information about a hardware resource, the resource manager manages, to the thread in accordance with a local rule described in advance. **Stamm et al.** teaches that a plurality of resource managers each corresponding to the resource manager are provided in conjunction with the types of the information about hardware resources (CL1, L23-25 and 28-30; CL1, L51-62; CL4, L36-38 and 54-55), and in the allocating a resource, the resource manager allocates the information about a hardware resource, the resource manager manages, to the thread (CL1, L23-25 and 28-30; CL1, L51-62; CL4, L36-38) in accordance with a local rule described in advance (CL1, L59-62; Abstract, L8-11; CL4, L11-16; CL4, L36-38; CL6, L1-5).

Per claim 5: **Emer et al.** does not expressly teach a plurality of resource managers each corresponding to the resource manager are provided in conjunction with the types of the information about hardware resources and are hierarchized according to the dependence among the information about hardware resources, and in the resource allocating, the allocation of information about a hardware resource is made in consideration of the dependence between the information about a hardware resource managed by one of the resource managers and the information about a hardware resource managed by the other resource manager lower in hierarchy than the one of the resource managers. **Stamm et al.** teaches a plurality of resource managers each corresponding to the resource manager are provided in conjunction with the types of the information about hardware resources (CL1, L23-25 and 28-30; CL1, L51-62; CL4, L36-38 and 54-55) and are hierarchized according to the dependence among the information about hardware resources (CL3, L8-10; CL4, L43-47; Fig. 5; CL5, L61-67; CL6, L1-5), and in the resource allocating, the allocation of information about a hardware resource is made in consideration of the dependence between the information about a hardware resource managed by one of the resource managers and the information about a hardware resource managed by the other resource manager lower in hierarchy than the one of the resource managers (CL3, L8-10; CL4, L43-47; Fig. 5; CL5, L61-67; CL6, L1-5).

Per claim 6: **Emer et al.** teaches that the resource manager monitors resource requests in the requesting a resource to make a decision on a resource request deadlock state among a plurality of threads as a result of the monitoring (CL3, L29-35; CL3, L49-55; CL9, L4-13)).

Per claim 7: **Emer et al.** teaches that the resource manager monitors requests with respect to the information about a hardware resource allocated by the resource request in the requesting a resource to make a decision on a competition state in operation on the information about a hardware resource among a plurality of threads on the basis of a result of the monitoring (CL2, L37-41; CL2, L44-56; CL3, L43-46).

Per claim 10: **Emer et al.** teaches that the thread has a budget on a time of occupancy of information about a hardware resource relating to a hardware resource allocated by the resource manager (CL4, L24-29; CL4, L32-34).

Per claim 11: **Emer et al.** teaches that the thread has an execution time-limit on the function (CL4, L24-29; CL4, L32-34)..

10.2 As per claim 12, **Emer et al.** teaches a method of simulating an operation of a logical unit (CL2, L16-21; CL5, L22-25); comprising:

a thread manager, which controls threads each forming an execution unit of a program, for execution of each of threads representative of a series of functions required until the operation of the logical unit reaches completion according to a design specification of the logical unit (Fig. 2; Fig. 3, Item 305; CL1, L7-21; Fig. 1(c); CL1, L66 to CL2, L3; CL2, L16-21);

requesting a resource in which a thread manager makes a request for information about a hardware resource relating to a hardware resource needed for execution of each of threads, to a resource manager which manages the information about the hardware resource (CL2, L3-6);

allocating a resource in which the resource manager allocates the information about a hardware resource meeting the request to the thread (CL2, L3-6);

controlling a thread in which the thread manager controls an execution state of the thread in accordance with a result of the allocation made by the resource manager (CL1, L10-21; Fig. 1 (c); CL1, L66 to CL2, L6);

dynamically allocating information about a hardware resource relating to necessary hardware resources to the thread by the resource manager every time the generated thread is executed (CL2, L3-6);

comparing a result of the simulation with an estimated value on the operation of the logical unit (CL5, L22-27);

and outputting a result of the comparison to an external unit (CL5, L22-27).

**Emer et al.** does not expressly teach allocating a resource in which the resource manager allocates the information about a hardware resource meeting the request to the thread in accordance with a rule prescribed in advance. **Stamm et al.** teaches allocating a resource in which the resource manager allocates the information about a hardware resource meeting the request to the thread in accordance with a rule prescribed in advance (CL1, L23-25 and 28-30; CL1, L51-62; Abstract, L8-11; CL4, L11-16; CL4, L36-38; CL6, L1-5).

**Emer et al.** teaches the thread manager and the resource manager executing the requesting, allocating, and controlling in cooperation with each other until the execution of the thread reaches completion simulating the operation of the logical unit to be conducted up to the completion (CL1, L10-21; Fig. 1 (c); CL1, L66 to CL2, L6). **Emer et al.** does not expressly

teach the thread manager and the resource manager executing the requesting, allocating, and controlling repeatedly in cooperation with each other until the execution of the thread reaches completion simulating the operation of the logical unit to be conducted up to the completion.

**Stamm et al.** teaches the thread manager and the resource manager executing the requesting, allocating, and controlling repeatedly in cooperation with each other until the execution of the thread reaches completion simulating the operation of the logical unit to be conducted up to the completion (Abstract; Fig. 3; Fig. 4).

10.3 As per claim 13, **Emer et al.** teaches an apparatus for simulating an operation of a logical unit (Fig. 2; Fig. 6; CL2, L16-21; CL5, L22-25); comprising:

a thread manager for controlling a thread forming an execution unit of a program (CL1, L10-21; Fig. 1 (c); CL1, L66 to CL2, L6);

a resource manager for managing information about a hardware resource relating to a hardware resource needed for execution of the thread (CL2, L3-6); the thread manager including:

a thread manager for execution of a thread representative of functions required until the operation of the logical unit reaches completion according to a design specification of the logical unit (Fig. 2; Fig. 3, Item 305; CL1, L7-21; Fig. 1(c); CL1, L66 to CL2, L3; CL2, L16-21);

resource requesting means for making a request for information about a hardware resource relating to a hardware resource needed for execution of a thread to the resource manager (CL2, L3-6);

thread control means for controlling an execution state of the thread in accordance with a result of a resource allocation made by the resource manager in response to the request from the

resource requesting means (CL1, L10-21; Fig. 1 (c); CL1, L66 to CL2, L6); the resource manager including:

resource allocating means for allocating information about a hardware resource relating to a hardware resource meeting the request to the thread (CL2, L3-6); and

dynamically allocating information about a hardware resource relating to necessary hardware resources to the thread by the resource manager every time the generated thread is executed (CL2, L3-6).

**Emer et al.** does not expressly teach resource allocating means for allocating information about a hardware resource relating to a hardware resource meeting the request to the thread in accordance with a rule prescribed in advance. **Stamm et al.** teaches resource allocating means for allocating information about a hardware resource relating to a hardware resource meeting the request to the thread in accordance with a rule prescribed in advance (CL1, L23-25 and 28-30; CL1, L51-62; Abstract, L8-11; CL4, L11-16; CL4, L36-38; CL6, L1-5).

**Emer et al.** teaches the thread manager and the resource manager conducting the resource request and the control of the thread execution state in cooperation with each other until the execution of the thread reaches completion for simulating the operation of the logical unit to be conducted up to the completion (CL1, L10-21; Fig. 1 (c); CL1, L66 to CL2, L6). **Emer et al.** does not expressly teach the thread manager and the resource manager conducting the resource request and the control of the thread execution state repeatedly in cooperation with each other until the execution of the thread reaches completion for simulating the operation of the logical unit to be conducted up to the completion. **Stamm et al.** teaches the thread manager and the

resource manager conducting the resource request and the control of the thread execution state repeatedly in cooperation with each other until the execution of the thread reaches completion for simulating the operation of the logical unit to be conducted up to the completion (Abstract; Fig. 3; Fig. 4).

10.4 As per Claim 14, it is rejected based on the same reasoning as Claim 13, supra. Claim 14 is a computer readable recording medium claim reciting the same limitations as Claim 13, as taught throughout by **Emer et al.** and **Stamm et al.**

10.5 As per Claims 15-22, these are rejected based on the same reasoning as Claims 4-11, supra. Claims 15-22 are a computer readable recording medium claim reciting the same limitations as Claims 4-11, as taught throughout by **Emer et al.** and **Stamm et al.**

10.6 As per Claims 23-31, these are rejected based on the same reasoning as Claims 2 and 4-11, supra. Claims 23-31 are computer readable recording medium claims reciting the same limitations as Claims 2 and 4-11, as taught throughout by **Emer et al.** and **Stamm et al.**

10.7 As per Claims 32-40, these are rejected based on the same reasoning as Claims 3 and 4-11, supra. Claims 32-40 are computer readable recording medium claims reciting the same limitations as Claims 3 and 4-11, as taught throughout by **Emer et al.** and **Stamm et al.**



10.8 As per Claim 41, it is rejected based on the same reasoning as Claim 12, supra. Claim 41 is a computer readable recording medium claim reciting the same limitations as Claim 12, as taught throughout by **Emer et al.** and **Stamm et al.**

11. Claims 8, 19, 28 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Emer et al.** (U.S. Patent 6,493,741) in view of **Stamm et al.** (U.S. Patent 6,711,616), and further in view of **Chrysos et al.** (U.S. Patent 6,549,930).

11.1 As per claim 8, **Emer et al.** and **Stamm et al.** teach the method of claim 1. **Emer et al.** teaches that the resource manager monitors the number of resource requests with respect to the information about a hardware resource (CL3, L29-35; CL3, L49-55).

**Emer et al.** and **Stamm et al.** do not expressly teach that the resource manager monitors the number of resource requests with respect to the information about a hardware resource to detect a bottleneck on the thread on the basis of a result of the monitoring. **Chrysos et al.** teaches that the resource manager monitors the number of resource requests with respect to the information about a hardware resource to detect a bottleneck on the thread on the basis of a result of the monitoring (CL2, L4-8; CL4, L50-55). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Emer et al.** and **Stamm et al.** with the method of **Chrysos et al.** that included the resource manager monitoring the number of resource requests with respect to the information about a hardware resource to detect a bottleneck on the thread on the basis of a result of the monitoring because that would allow measuring the resource utilizations of the threads while they were executing and scheduling the

threads according to the measured resource utilizations (Abstract, L2-7), so the computer system performance could be optimized (CL1, L49-50).

11.2 As per Claims 19, 28 and 37, these are rejected based on the same reasoning as Claim 8, supra. Claims 19, 28 and 37 are computer readable recording medium claims reciting the same limitations as Claim 8, as taught throughout by **Emer et al.**, **Stamm et al.** and **Chrysos et al.**

12. Claims 9, 20, 29 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Emer et al.** (U.S. Patent 6,493,741) in view of **Stamm et al.** (U.S. Patent 6,711,616), and further in view of **Agrawal et al.** (U.S. Patent 5,768,500).

12.1 As per claim 9, **Emer et al.** and **Stamm et al.** teach the method of claim 1. **Emer et al.** and **Stamm et al.** do not expressly teach that the resource manager monitors the number of resource requests with respect to the information about a hardware resource to detect blocking of the resource requests on the basis of a result of the monitoring. **Agrawal et al.** teaches that the resource manager monitors the number of resource requests with respect to the information about a hardware resource to detect blocking of the resource requests on the basis of a result of the monitoring (CL8, L34-45; CL15, L20-25; CL18, L10-32). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Emer et al.** and **Stamm et al.** with the method of **Agrawal et al.** that included the resource manager monitoring the number of resource requests with respect to the information about a hardware resource to detect blocking of the resource requests on the basis of a result of the monitoring

because that would allow isolating performance bottlenecks and guiding optimization of architectures, operating systems, compilers and applications (CL2, L52-55).

12.2 As per Claims 20, 29 and 38, these are rejected based on the same reasoning as Claim 9, supra. Claims 20, 29 and 38 are computer readable recording medium claims reciting the same limitations as Claim 9, as taught throughout by **Emer et al.**, **Stamm et al.** and **Agrawal et al.**

### ***Response to Arguments***

13. Applicants' arguments filed on October 5, 2007 have been fully considered. Additional claim rejections under 35 USC 112 First paragraph have been included in this Office Action. In addition, new art rejections under 35 USC 103 (a) have been presented in this Office Action in response to Applicants' arguments.

13.1 As per the applicants' argument that "the Examiner's assertion that Dearth '242 teaches a thread manager that makes a request for information about a hardware resource relating to a hardware resource needed for execution of each of threads, to a resource manager which manages the information about the hardware resource is not supported", the Examiner has used a new reference **Emer et al.**

**Emer et al.** teaches a thread manager makes a request for information about a hardware resource relating to a hardware resource needed for execution of each of threads, to a resource manager which manages the information about the hardware resource (CL2, L3-6).

13.2 As per the applicants' argument that "the Examiner's assertion that Dearth '824 teaches allocating a resource in which the resource manager allocates the information about a hardware resource meeting the request to the thread in accordance with a rule prescribed in advance is not supported", the Examiner has used a new reference **Stamm et al.**

**Stamm et al.** teaches allocating a resource in which the resource manager allocates the information about a hardware resource meeting the request to the thread in accordance with a rule prescribed in advance (CL1, L23-25 and 28-30; CL1, L51-62; Abstract, L8-11; CL4, L11-16; CL4, L36-38; CL6, L1-5).

13.3 As per the applicants' argument that "the Examiners assertion that Dearth '242, alone, teaches the thread manager and the resource manager execute the requesting, allocating, and controlling repeatedly in cooperation with each other is not supported", the Examiner has used a new reference **Stamm et al.**

**Stamm et al.** teaches the thread manager and the resource manager executing the requesting, allocating, and controlling repeatedly in cooperation with each other until the

execution of the thread reaches completion simulating the operation of the logical unit to be conducted up to the completion (Abstract; Fig. 3; Fig. 4).

13.4 As per the applicants' argument that "the Examiners assertion that Levy teaches dynamically allocating information about a hardware resource relating to necessary hardware resources to the thread by the-resource manager every time the generated thread is not supported", the Examiner has used a new reference **Emer et al.**

**Emer et al.** teaches dynamically allocating information about a hardware resource relating to necessary hardware resources to the thread by the resource manager every time the generated thread is executed (CL2, L3-6).

13.5 As per the applicants' argument that "even an arguendo combination of the art relied on by the Examiner does not teach recited features of claim 1, it is submitted that prima facie case of obviousness is not established; even if the art relied on by the Examiner does teach recited features of claim 1, it is submitted that an arguendo combination is unworkable and without motivation for such a modification and a prima facie case of obviousness is not established", the has used a new reference **Emer et al.** and **Stamm et al.** and identified the motivation to combine in **Stamm et al.** as indicated in Paragraph 10.1 above.

### ***Conclusion***

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Kandasamy Thangavelu whose telephone number is 571-272-3717. The examiner can normally be reached on Monday through Friday from 8:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez, can be reached on 571-272-3753. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to TC 2100 Group receptionist: 571-272-2100.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'K. Thangavelu', with a large, stylized loop at the end.

K. Thangavelu  
Art Unit 2123  
January 10, 2008